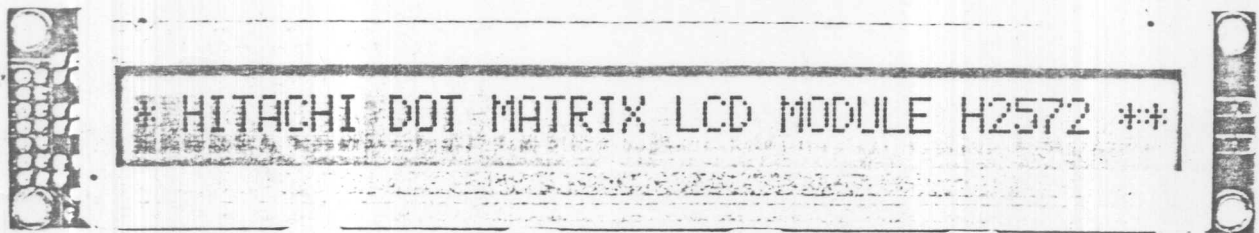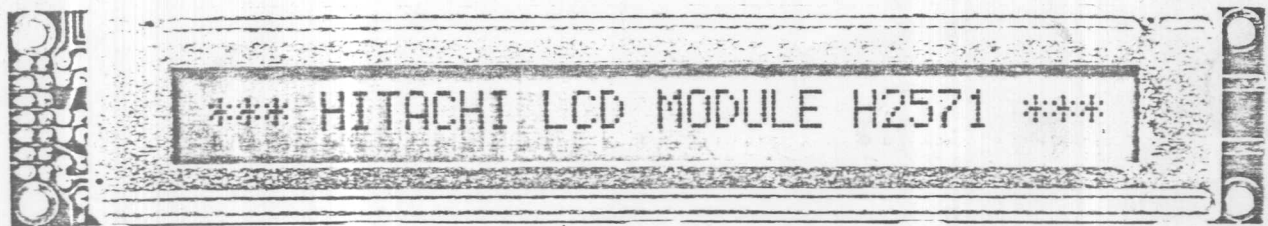# ALPHANUMERIC DOT MATRIX LCD MODULE
H2570·H2571·H2572

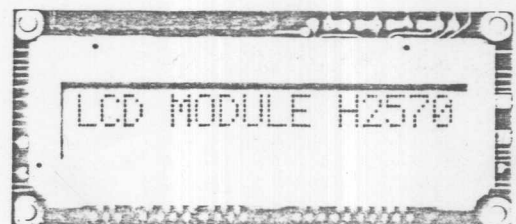TENTATIVE DATA

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H2572: 40 characters

H2571: 32 characters

DESCRIPTION

The H2570, H2571, H2572 are a new line of liquied crystal display modules from Hitachi. These modules utilize 5 x 7 and 5 x 10 dot matrix characters to provide full alphanumeric capability. All control, refresh, and display functions are executed by a dedicated on-board controller. This architecture yields minimum flexibility and very high reliability.

All LCD modules are capable of displaying the full 160-character JIS font set (which includes lower case descenders) plus 32-character special font sets under user software control. The displayed characters are easily readable and gave a contrast ratio that improves as ambient light is increased.

Data interfacing is via an 8-bit bi-directional data bus or a 4-bit one. By use of simple control commands, data can be selectively written to (or read from) any cursor location, arbitrary fonts can be written to CHARACTER GENERATOR RAM, the mode of display function can be determined and so on.

H2570: 16 characters

Note: The information contained herein is tentative and way be changed without prior notice. It is therefore advisable to contact Hitachi before processing with the design of equipment in corporating this product.

quantum electronics
Box 391262
Bramley
2018

FEATURES

- 5 x 7 and 5 x 10 dot matrix with cursor
- Single +5 V power supply
- On-board control LSI (HD44780)
- Powerful control commands
  - Display clear
  - Cursor home
  - Display shift
  - Display data read/write etc.
- Microprocessor-compatible data bus interface (8 bit or 4 bit)
- Exceptionally low power consumption
- Extremely compact and light weight

APPLICATIONS

HITACHI Alphanumeric Displays can be used in a wide variety of applications including (but not limited to):

- Portable data terminals
- Handheld computers
- Telephone interconnect equipment
- Text editing devices (e.g. word-processors and typesetters)
- Automated scales and labeling equipment
- Process controllers
- TTY Terminals for the deaf

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	min.	max.	Unit
Power supply for logic	$V_{DD}-V_{SS}$	0	7.0	V
Power supply for LCD drive	$V_{DD}-V_o$	0	13.5	V
Input voltage	Vi	V_{SS}	V_{DD}	V
Static electricity	—	—	100	V
Operating temperature	Ta	0	50	°C
Storage temperature	Tstg	−20	70	°C

ELECTRIC CHARACTERISTICS

Ta = 25°C, V_{DD} = 5.0V ± 0.25V

Item	Symbol	Condition		min.	typ.	max.	Unit
Input "high" voltage	V_{iH}	—		2.0	—	—	V
Input "low" voltage	V_{iL}	—		—	—	0.8	V
Output "high" voltage	V_{oH}	$-I_{oH}$ = 0.2 mA		2.4	—	—	V
Output "low" voltage	V_{oL}	I_{oL} = 1.6 mA		—	—	0.4	V
Power supply current	I_{DD}	V_{DD} = 5.0 V		—	0.5	2.0	mA
Power supply for LCD drive (Recommended)	$V_{DD}-V_o$	Duty = 1/11	Ta = 0°C	—	4.2	—	V
			Ta = 25°C	—	3.8	—	V
			Ta = 50°C	—	3.3	—	V
		Duty = 1/8	Ta = 0°C	—	4.0	—	V
			Ta = 25°C	—	3.7	—	V
			Ta = 50°C	—	3.3	—	V

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TIMING CHARACTERISTICS

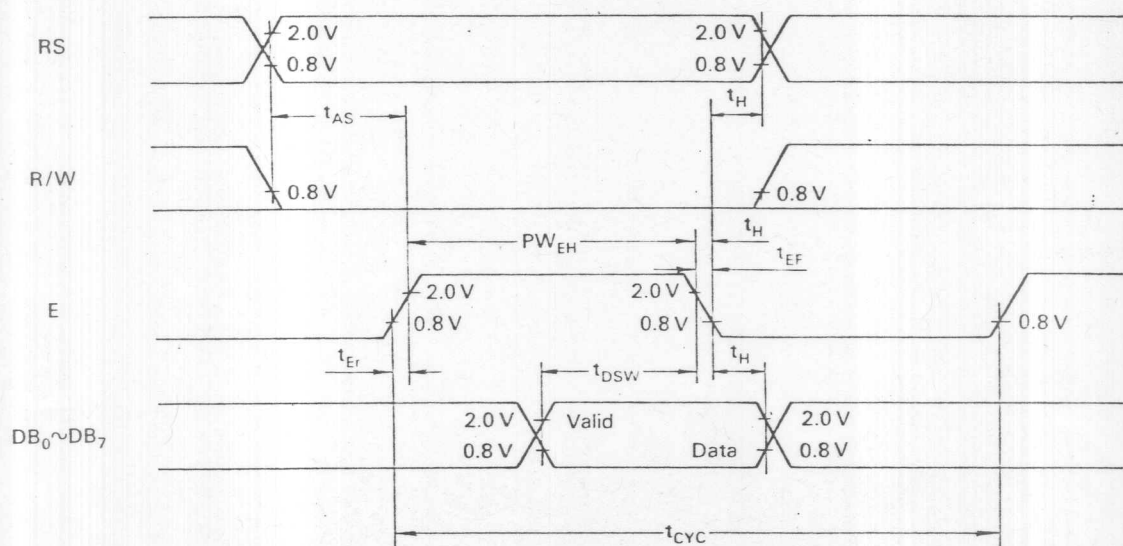| Item	Symbol	Test condition	min.	typ.	max.	Unit
Enable cycle time	t_{cyc}	Fig. 1, Fig. 2	1.0	—	—	μs
Enable pulse width	P_{WEH}	Fig. 1, Fig. 2	450	—	—	ns
Enable rise/fall time	t_{Er}, t_{Ef}	Fig. 1, Fig. 2	—	—	25	ns
RS, R/W set up time	t_{AS}	Fig. 1, Fig. 2	140	—	—	ns
Data delay time	t_{DDR}	Fig. 2	—	—	300	ns
Data set up time	t_{DSW}	Fig. 1	225	—	—	ns
Hold time	t_H	Fig. 1, Fig. 2	10	—	—	ns

Write operation

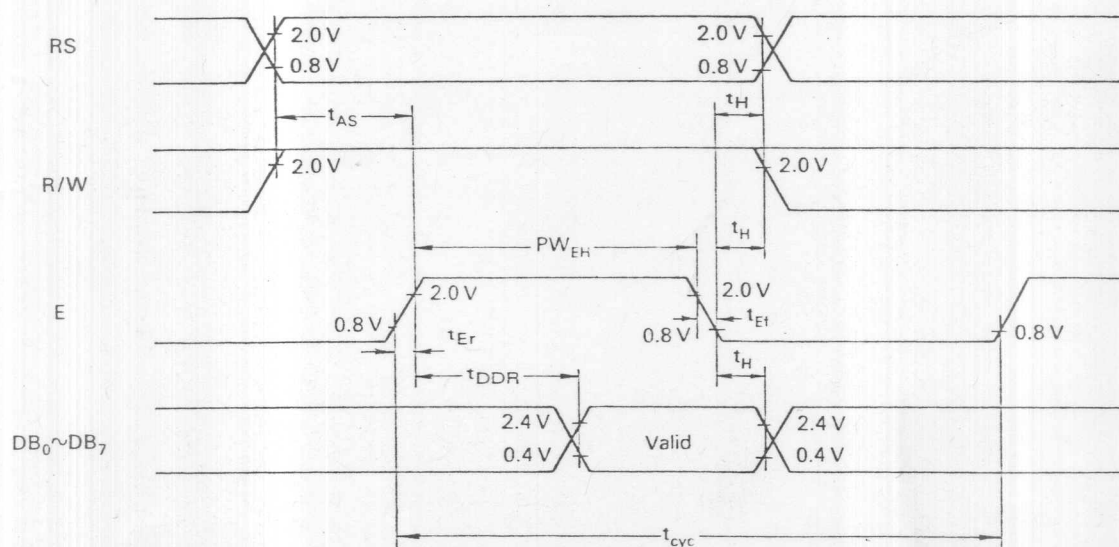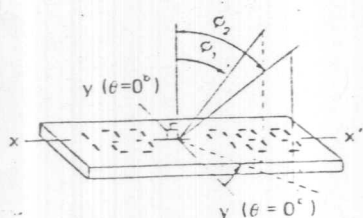Fig. 1 Interface timing (Data write)

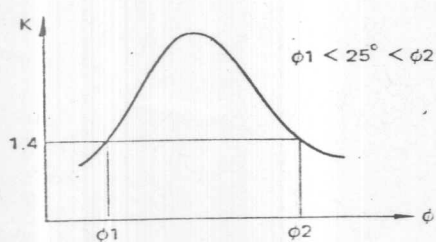Read operation

Fig. 2 Interface timing (Data read)

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3

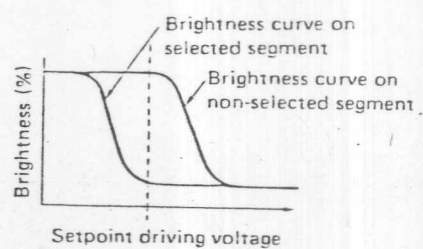| Item	Symbol	Condition	min.	typ.	max.	Unit	Note
Viewing area	$\phi_2 - \phi_1$	K = 1.4	20	—	—	deg	1, 2
Contrast ratio	K	$\phi = 25°$ $\theta = 0°$	3	—	—	—	3
Response time (rise)	t_r	$\phi = 25°$	—	150	250	ms	4
Response time (fall)	t_f	$\phi = 25°$	—	150	250	ms	4

Note 1. Definition of θ and ϕ

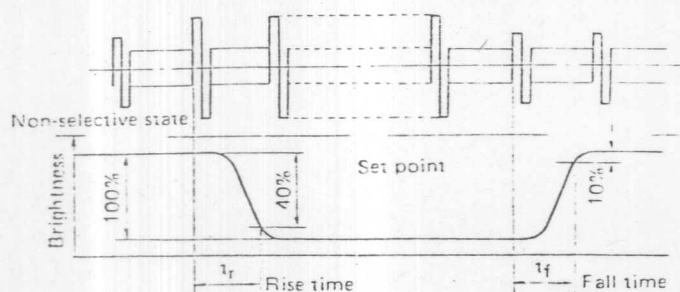Note 2. Definition of viewing angle $\phi1$, and $\phi2$:

$\phi1 < 25° < \phi2$

Contrast ratio K vs viewing angle ϕ

Note 3. Definition of contrast "K"

$$K = \frac{\text{Brightness on non-selected segment } (B_2)}{\text{Brightness on selected segment } (B_1)}$$

Brightness curve on selected segment

Brightness curve on non-selected segment

Setpoint driving voltage

Note 4 Definition of optical response

Non-selective state

Set point

Brightness

100%

40%

10%

t_r — Rise time

t_f — Fall time

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LCD Module — VDD, Vo (LCD Driving Voltage), Vss, (+5V), VR, Vcc

VR: 10 ~ 20KΩ
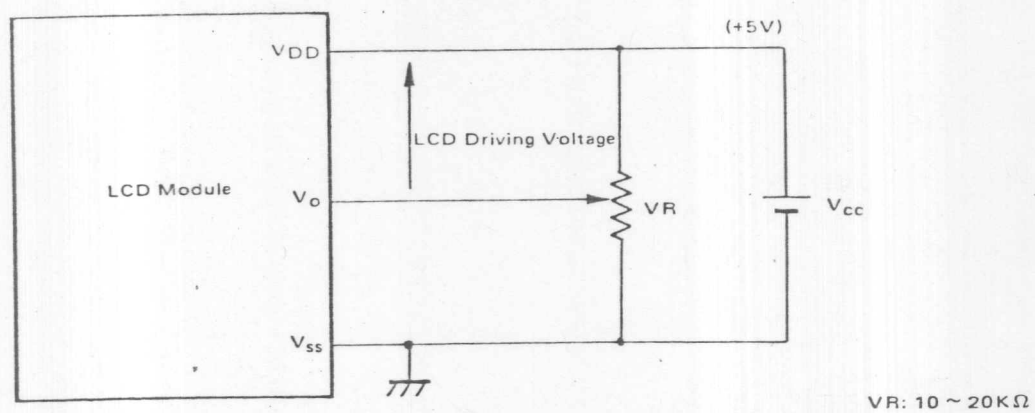
DIMENSIONAL OUTLINE

Item \ Type No.	H2570	H2571	H2572
Number of display character	16 x 1 line with cursor	32 x 1 line with cursor	40 x 1 line with cursor
Module size (mm) width x height x thickness	80 x 36 x 12	174.5 x 31.0 x 13.4	182 x 33.5 x 13
Effective display area width x height (mm)	64.5 x 13.8	132.5 x 14.0	154.4 x 15.8
Weight (g)	25	60	65

⊚ HITACHI
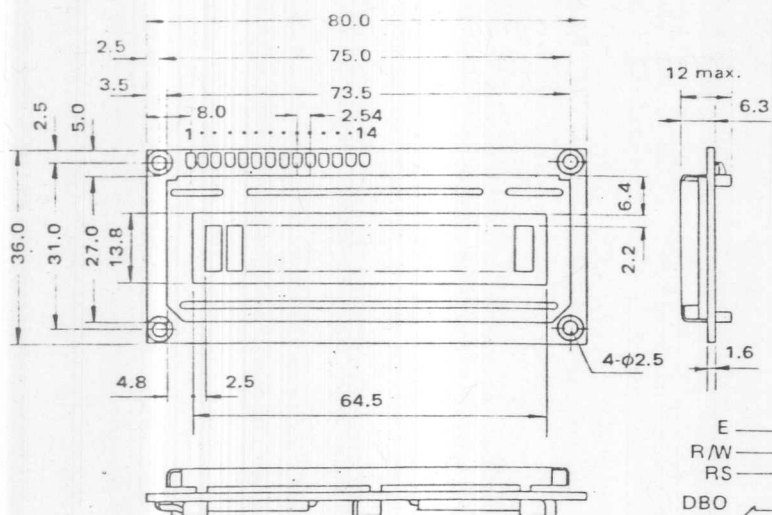
H2570

± 59.80
± 34 00 +1000

Dimensions in mm

BLOCK DIAGRAM OF H2570
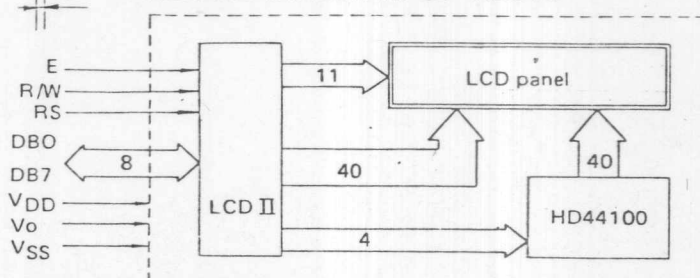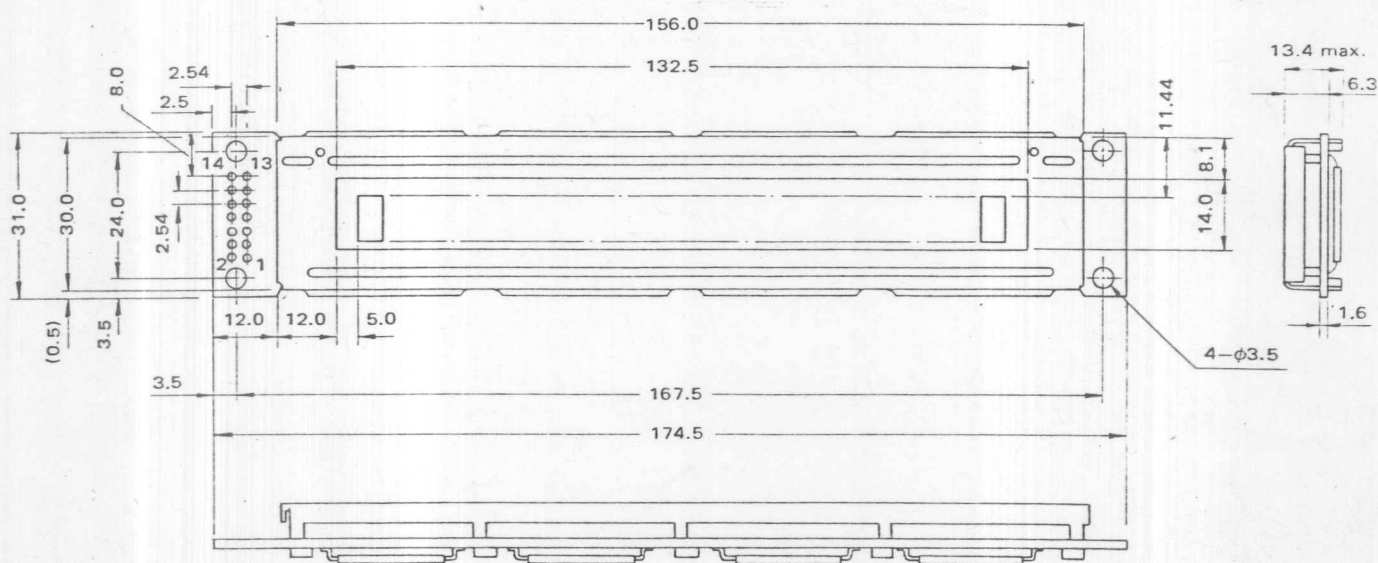

H2571

Dimensions in mm.

BLOCK DIAGRAM OF H2571

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6

Dimensions in mm.

4 – φ3.5

13 max.

6.3

(5×7)
(5×11)

2.5
2.54
10.5
14   13
2.54
26.5
3.5
2   1

3.5   2.85
16.3

149.4
154.4
175.0
182

5.5   13.25
8.5
8.7   15.8
33.5

1.6

BLOCK DIAGRAM OF H2572

E
R/W
RS
DB0
DB7
V_{DD}
V_o
V_{SS}

11
8
40
4

LCD II

LCD panel

HD44100   HD44100   HD44100   HD44100

40   40   40   40
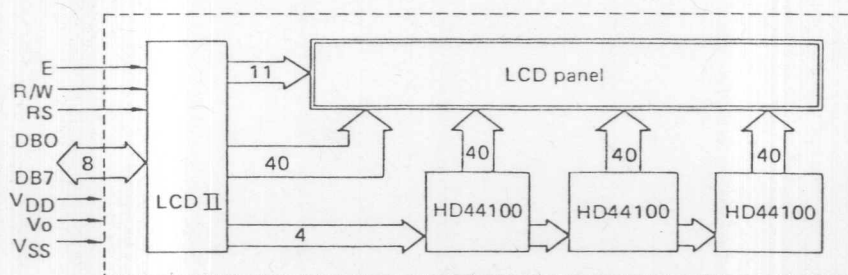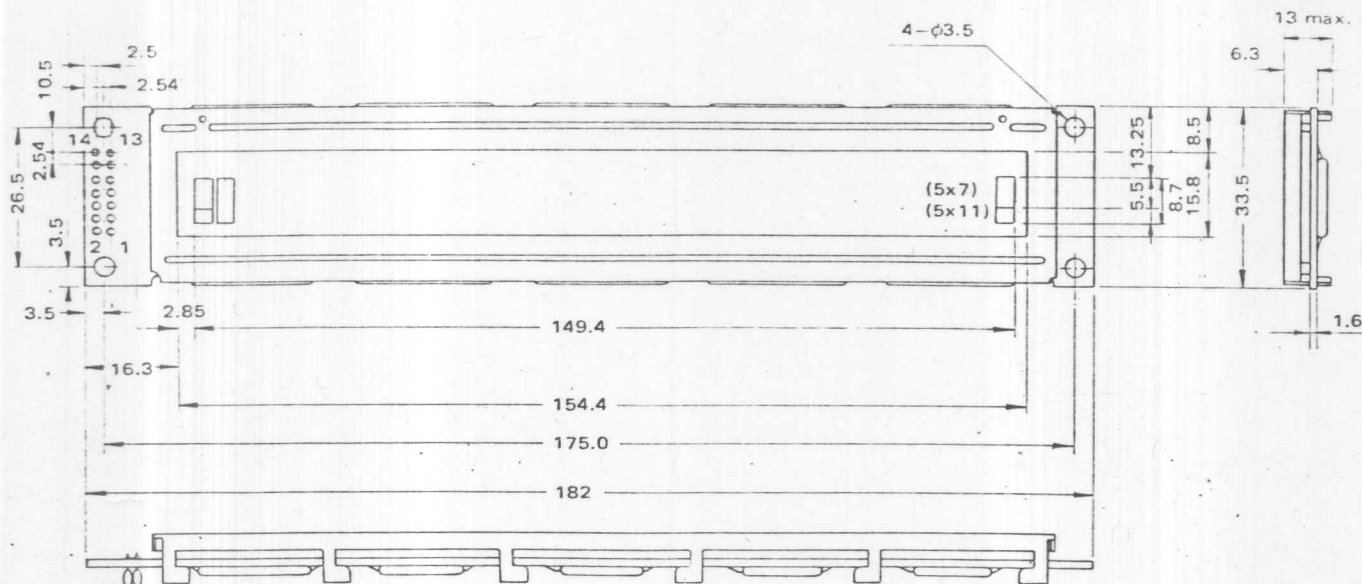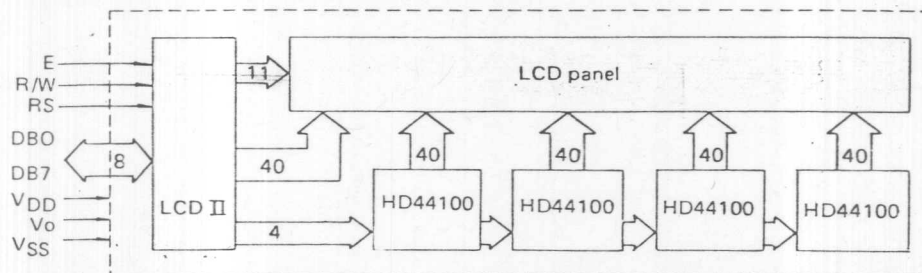
DETAILED DRAWINGS OF MATRIX PATTERN OF H2570, H2571 and H2572

Dimensions in mm.

0.7
0.8

8.7

0.55
0.65

3.15

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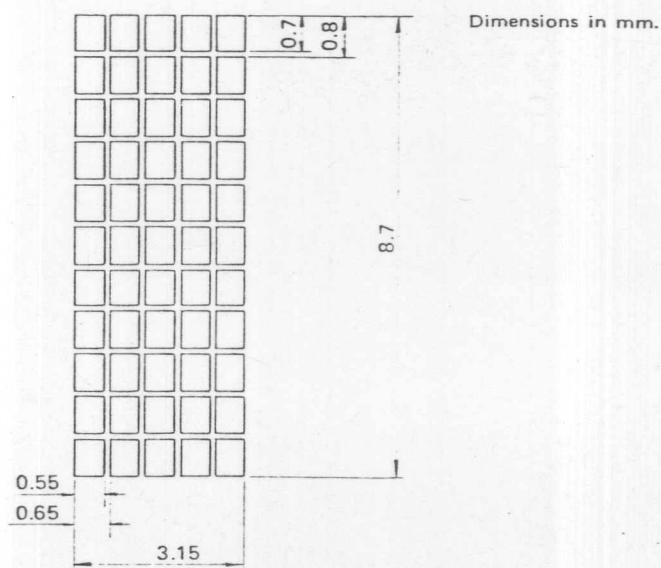
Pin No.	Symbol	Level	Function	
1	V_{SS}	–	0V	Power supply
2	V_{DD}	–	5V	
3	V_o	–	–	
4	RS	H/L	L: Instruction code input H: Data input	
5	R/W	H/L	H: Data read (LCD module→MPU) L: Data write (LCD module←MPU)	
6	E	H, H→L	Enable signal	
7	DB0	H/L		
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L	Data bus line Note (1), Note (2)	
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		

Note:

In the HD44780, the data can be sent in either 4-bit 2-operation or 8-bit 1-operation so that it can interface to both 4 and 8 bit MPU's.

(1) When interface data is 4 bits long, data is transferred using only 4 buses of $DB_4 \sim DB_7$ and $DB_0 \sim DB_3$ are not used. Data transfer between the HD44780 and the MPU completes when 4-bit data is transferred twice. Data of the higher order 4 bits (contents of $DB_4 \sim DB_7$ when interface data is 8 bits long) is transferred first and then lower order 4 bits (contents of $DB_0 \sim DB_3$ when interface data is 8 bits long).

(2) When interface data is 8 bits long, data is transferred using 8 data buses of $DB_0 \sim DB_7$.

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Instruction	Code										Description	Execution time (when fcp or fosc is 250 KHz)
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear display	0	0	0	0	0	0	0	0	0	1	Clears all display and returns the cursor to the home position (Address 0).	82 μs ~ 1.64 ms
Return home	0	0	0	0	0	0	0	0	1	*	Returns the cursor to the home position (Address 0). Also returns the display being shifted to the original position. DD RAM contents remain unchanged.	40 μs ~ 1.6 ms
Entry mode set	0	0	0	0	0	0	0	1	I/D	S	Sets the cursor move direction and specifies or not to shift the display. These operations are performed during data write and read.	40 μs
Display ON/OFF control	0	0	0	0	0	0	1	D	C	B	Sets ON/OFF of all display (D), cursor ON/OFF (C), and blink of cursor position character (B).	40 μs
Cursor of display shift	0	0	0	0	0	1	S/C	R/L	*	*	Moves the cursor and shifts the display without changing DD RAM contents	40 μs
Function set	0	0	0	0	1	DL	N	F	*	*	Sets interface data length (DL) number of display lines (L) and character font (F).	40 μs
Set CG RAM address	0	0	0	1	A_{CG}						Sets the CG RAM address. CG RAM data is sent and received after this setting.	40 μs
Set DD RAM address	0	0	1	A_{DD}							Sets the DD RAM address. DD RAM data is sent and received after this setting.	40 μs
Read busy flag & address	0	1	BF	AC							Reads Busy flag (BF) indicating internal operation is being performed and reads address counter contents.	40 μs
Write data to CG or DD RAM	1	0	Write Data								Writes data into DD RAM or CG RAM.	40 μs
Read data to CG or DD RAM	1	1	Read Data								Reads data from DD RAM or CG RAM.	40 μs

I/D = 1: Increment   I/D = 0: Decrement
S = 1: Accompanies display shift.
S/C = 1: Display shift   S/C = 0: Cursor move
R/L = 1: Shift to the right.
R/L = 0: Shift to the left.
DL = 1: 8 bits   DL = 0: 4 bits
N = 1: 2 lines   N = 0: 1 line
F = 1: 5 x 10 dots   F = 0: 5 x 7 dots
BF = 1: Internally operating
BF = 0: Can accept instruction

DD RAM: Display data RAM
CG RAM: Character generator RAM
A_{CG}: CG RAM address
A_{DD}: DD RAM address Corresponds to cursor address.
AC: Address counter used for both of DD and CG RAM address.

Execution time changes when frequency changes. (Example) When fcp or fosc is 270 KHz:

$$40\ \mu s \times \frac{250}{270} = 37\ \mu s$$

*Dont' care
For details, refer to "HITACHI MICROCOMPUTER SYSTEM: DOT MATRIX LIQUID CRYSTAL DISPLAY CONTROLLER & DRIVER LCD-II (HD44780) USER'S MANUAL".

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Lower 4bit \ Higher 4bit	0000	0010	0011	0100	0101	0110	0111	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)		0	@	P	`	p		―	９	ミ	α	p
xxxx0001	(2)	!	1	A	Q	a	q	。	ア	チ	ム	ä	q
xxxx0010	(3)	"	2	B	R	b	r	「	イ	ツ	メ	β	θ
xxxx0011	(4)	#	3	C	S	c	s	、	ウ	テ	モ	ε	∞
xxxx0100	(5)	$	4	D	T	d	t	、	エ	ト	ヤ	μ	Ω
xxxx0101	(6)	%	5	E	U	e	u	・	オ	ナ	ユ	σ	ü
xxxx0110	(7)	&	6	F	V	f	v	ヲ	カ	ニ	ヨ	ρ	Σ
xxxx0111	(8)	'	7	G	W	g	w	ア	キ	ヌ	ラ	g	π
xxxx1000	(1)	(	8	H	X	h	x	ィ	ク	ネ	リ	∫	x̄
xxxx1001	(2)	)	9	I	Y	i	y	ゥ	ケ	ノ	ル	⁻¹	y
xxxx1010	(3)	*	:	J	Z	j	z	ェ	コ	ハ	レ	j	千
xxxx1011	(4)	+	;	K	[	k	｛	ォ	サ	ヒ	ロ	×	万
xxxx1100	(5)	,	<	L	¥	l			ャ	シ	フ	ワ	¢	円
xxxx1101	(6)	-	=	M	]	m	}	ュ	ス	ヘ	ン	£	÷
xxxx1110	(7)	.	>	N	^	n	→	ョ	セ	ホ	゛	ñ	
xxxx1111	(8)	/	?	O	_	o	←	ツ	ソ	マ	゜	ö	█

HITACHI

1. Mounting method

Since H2570, H2571 and H2572 are so constructed as to be fixed by utilizing fitting holes in the printed circuit board as shown below, it is necessary to take consideration the following items on attachment to a frame.
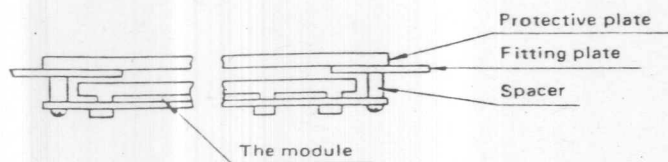
Example of mounting

(1) Use of a protective plate, made of an acrylic plate, etc. in order to protect a polarizer and LC cell.

(2) To prevent the module cover from being pressed, the spacers between the module and the fitting plates should be longer than 5.5 in mm.

2. LC driving voltage (Vo) and viewing angle range

Setting Vo out of the recommended condition will be a cause for a change of viewing angle range.

3. Caution against static charge

As this module is provided with C-MOS LSI, the care to take such a precaution as to grounding the operator's body is required when handling it.